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1884

THE HARVEIAN ORATION.

THE
HARVEIAN ORATION

DELIVERED AT

The Royal College of Physicians, London,

ON OCTOBER 18, 1884.

BY

J. RUSSELL REYNOLDS, M.D., F.R.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
FELLOW OF THE IMPERIAL LEOPOLD-CAROLINA INSTITUTE OF NATURALISTS OF GERMANY;
MEMBER OF THE NEUROLOGICAL SOCIETY OF AMERICA;
EMERITUS PROFESSOR OF MEDICINE IN UNIVERSITY COLLEGE, LONDON;
PHYSICIAN IN ORDINARY TO HER MAJESTY'S HOUSEHOLD;
CONSULTING PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL.



LONDON:
J. & A. CHURCHILL,
11, NEW BURLINGTON STREET,
1884.

151. e. 16.



TO
SIR WILLIAM JENNER, BART., K.C.B.,

M.D. LOND., D.C.L. OXON., LL.D. CAMB. AND EDIN., F.R.S. ;
PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON ;
PHYSICIAN IN ORDINARY TO HER MAJESTY THE QUEEN AND TO HIS ROYAL
HIGHNESS THE PRINCE OF WALES,

This Oration is Dedicated

WITH PROFOUND RESPECT AND AFFECTIONATE REGARD
BY
HIS FORMER PUPIL, COLLEAGUE, AND ALWAYS ATTACHED
FRIEND,

J. RUSSELL REYNOLDS.



SIR WILLIAM JENNER,
HONOURED PRESIDENT OF THIS LEARNED COLLEGE,

BEFORE entering on the subject which now brings us here, I must ask you to accept my thanks for the distinction you have conferred on me, in selecting me for the office I have the honour to fill to-day, an honour, allow me to add, which carries with it a special gratification to myself, inasmuch as among the many distinctions conferred by this College on my grandfather, the late Dr. Henry Revell Reynolds, there was not one he prized more highly than that of having delivered, as he did, before the President and Fellows of this College, one hundred and eight years ago,* the

HARVEIAN ORATION.

MR. PRESIDENT, FELLOWS OF THIS COLLEGE, AND GENTLEMEN,

SIR THOMAS BROWNE has said, in one of his sadder moods, "Our fathers find their graves in our short memories, and sadly tell us how we may be buried in our survivors. . . . The greater part must be content to be as though they had not been,—to be found in the register of God, not in the memory of man."

* Roll of the Royal College of Physicians of London. Edited by Dr. Munk, vol. ii., p. 300.

This is, without doubt, true, as he said, of the "greater part," but it is not true of all; for our meeting here to-day is an assertion that there is, at least, one who has not yet found his grave in our vanishing powers of recollection; but whose life, unburied, still breathes in the lives of living, acting men.

It is not of the sorrows and "unavailing tears" that were shed, nearly two hundred and thirty years ago, over Harvey's grave, that it behoves me now to speak; but rather of the fact that nearly three centuries have passed since he became a part of this College; and yet, that only last year, on the eighteenth day of October, our College repaired to his grave in Hempstead, to do honour to his memory; and with gratitude and gladness to assert, as we do again to-day, that he still lives "in his survivors;" and that, although the knells of three hundred and six years have been tolled since Harvey's life began, he, at the present hour is neither dead nor sleeping.

I. Let me ask you, for a few moments, to think over that act of last year. It is not meet to call it a "ceremony" or "performance," for those words may have a doubtful meaning. It was a something done; and that with purpose. It was done with reverence and solemnity, and fitting formal circumstance. The like of it has not often been seen in this country. It was simple, but it told of much complex thought and feeling. It was grave, but it was not sad; it was official, but it was not heartless. It was unnecessary, but it was urgent; it was a duty to the remains of Harvey, but it was also an honour to ourselves. Its voice could not "provoke the silent dust," but its tone—not that of "flattery" to "soothe the dull, cold ear of death"—was such as could stir the now living "ear" and heart, and quicken the still acting brain.

A. One thing that this College did last year was to show regard for the *bodily* remains of Harvey. There was a something of him—that neither painting nor bust could be—which it still wished to cherish. It would try to hold together, yet longer, the last remnants of what was once the medium through which he saw Nature, and by which he read many of her secrets, and revealed them. This wish is natural ; and old because it is so. If some Eastern nations, in their great reverence for the Soul, have taken means to display their contempt for the Body which it has left, such peoples have been the exception. The Pyramids, the Abbeys, the great burial-grounds in town and country, and the world's great surface, scattered over with its complex or simple tombs, all tell the same story of regard for the dust and ashes of those who are gone. Even if the body has been burned, the Urn has been found to hold together the ashes that the flames have not had power to kill. We may know, and admit "to what base uses we may return ;" but still, we resent or recoil from the degradation. There is a widely spread human struggle against allowing the bodies of those we have known, and revered, and loved, to merge into the common earth. We set up our barriers against it ; we entomb, and we embalm ; we carry on a fight, as strong in feeling as it may be futile in effect, but still, a real fight, against physical disintegration. This may be all very foolish and unscientific ; but yet, we will, if we can, keep together something of the individual, so long as time and outside forces are not too strong for us ; and we utter a parable, as we do so, of our regard not only for the bodies, but for the lives of those individual men, as we tell of, or come to know them, in the thousand biographies, that surround us, each one of which is, in its very essence, "a feeble struggle with death."

The notion that some spark or germ of life might lie hidden in the ashes that were buried or inurned ("lateat

scintillula forsan ") may have had much to do with the careful keeping of the ashes, in the past ; but that is not all. Even if Science could quite put out this faint "scintilla," the human Instinct would remain ; and would show itself beside almost every open grave, and sometimes display itself in such solemn and remarkable event as that which took place last year at the tomb of Harvey.

It was a graceful and an honourable act of this College to take upon itself the work of "Old Mortality ;" and to travel away from its ordinary home that it might chisel afresh the marbles that held the remains of its greatest son ; —but, much more than this was accomplished at that time, for therein was shown a profound and still living affection, reverence, and gratitude for Harvey's life.

B. We, again to-day, would do homage to the *life* of Harvey ; looking at it in its threefold aspect of moral, mental, and active energy. We commemorate his character ; his rare combination of faculties ; and his work achieved. In him there was that due proportion between all his powers which a great thinker of this generation has regarded as the root-fact of what we call "genius."

i. We like to picture to ourselves what he, now dead in body, resembled when he lived ; how he thought ; and about what he thought ; how and what he did ; in what light he regarded his own work ; its relation to the work of others ; to his ancestors in science, to his immediate predecessors, his associates, his antagonists ; and to those who must come after him.

This is as natural as is the regard for the bodily remains ; but it is on a higher level. Ancient "songs" handed down, in earlier days, the noble deeds, thoughts, words, and characters, of those whom it was a religion to venerate, and whose memory it was a bounden duty to prolong. Our short

biographies in epitaphs, our longer biographies in books bear witness to our dislike to the cremation of ideas and of individual life. There is, doubtless, much disintegration and cremation, of a very healthy sort, always going on among the works of the living as well as of the dead ; and very small Urns might hold all that is worth keeping of the life-work of many. Still, even on these, we should like to engrave the names. Perhaps, in most lives, there are many things that those who lived them might gladly see burned away ; but (as Sir Thomas Browne says) "we cannot hire oblivion," and even if "a wise oblivion be a greater good than a strong memory," we still like to preserve the individuality of the really great ones of the earth, and that, with all their faults ; and we resent—as we do with quite small people—either a flattering, or disparaging, or a one-sided picture.

Reading Harvey's own writings, his theses, their introductions, their dedications, his disquisitions, exercises, letters and "obiter dicta," we find him writing, all unconsciously, his own biography ; and this confers an unspeakable charm upon his works. He does not tell us of his birthplace, or parentage, or where he was taught, or how he lived—which, thanks to many who have written of these things, from Aubrey and Ent to Willis, we know fairly well—but he reveals his very soul and life, his method of work, and his mode of thinking about it all ; as he spent those long years of research, experiment, discovery and disputation, together with all the toils of a teacher, and the cares of a busy practitioner of medicine.

Thoughts, discoveries, and lives are quickly disintegrated in this fast-moving, restless age, the rate of whose movement shows acceleration every year ; and so there is much individual work that must soon pass into, and be lost in, the sum of common knowledge, and become only the ground-work upon which many a superstructure may be raised ; but

the personality of Harvey can never be lost sight of, so long as this College stands, and so long as there are men who care to "read between the lines" of his great works, and find in them the portrait of himself.

It is important, in our attempt to realize this portrait, that we should look—in order to appreciate its value—at the background of the time in which the great artist sketched it.

a. Harvey's work of discovery, like that of all great discoveries—into whatever reach of knowledge and of thought they may have broken—was not unprepared. Men were, in his time, eagerly looking for a light that they felt sure was coming; and there were streaks of dawn in the Eastern sky, that led them to find the Man, and the Truth, for which they had been seeking; so that what before had been mysterious, was now clear; what had been dark, was now illumined; what they had sought for, now they found.

The contents of the "shell," on the like of which Harvey afterwards wrote so much, were teeming with a growing life that showed but vague signs upon its smooth, unbroken surface; but Harvey broke the shell, and there burst forth at once, into a seen life, a form and meaning for which all the growing processes within that shell were made. There was a new thing, a new thought, a new generalization. There was the solution of the problem of yesterday, the answered riddle, the platform for to-morrow's work.

All honour to those who, toiling slowly in the night, or in the dawn, with its mist and mystery, have yet made some headway forward and upward, and prepared the path for one among them, who has shared their labour, their weariness, their disappointments, and their woes; but, who suddenly makes, as it were, a leap to a wider range or to a higher level; and, thence, holds out the hand of strength and fellowship to place them by his side. We honour the

worker, wherever he may be, so long as his labour is honest, and is his best; but we have only scant words to express the regard in which we hold the man whose discerning thought and practised skill has lifted all workmen higher; opened to them new ranges for their toil; given them new methods to follow, and left behind him footprints in which some of them may tread, as he goes before them, and passes out of sight.

The peoples in this world have been always fighting, from the days of Cain and Abel until now; but yet there is a book, written not so very long ago, with the title of "The Fifteen Decisive Battles of the World," and perhaps time is yet too young for any one to say that a sixteenth has been fought. But, in the great conflicts of schools of science, of thought, and of discovery with regard to human life, can we put our finger upon even so many as "fifteen" who have made such marks in history that their works have followed them as "decisive battles" gained? If there be, let us gladly thank all the great heroes who led these fights; but, if we look among them, there is no one, whom the gathered-up roll of leaders in the world of thought can show, who stands on a higher plane than does our own immortal Harvey.

b. If we would appreciate the value of his work, we must read the writings and become familiar with the beliefs current at his time. We may find their echoes in his replies to his opponents, and see quite plainly that the notions he had to contend with were not even "guesses at truth," but often merely pompous assertions of meaningless nothings—"traditions vainly received,"—but yet held with the cramp-like grasp of drowning men who clutch at straws, and yet uttered with the confidence of those, who might be supposed, from the loudness of their cry, to be standing firmly and steadily on solid ground.

Those who held them were quite incapable of perceiving

that they were empty dogmata, without one particle of substance in their constitution, or one square inch of fact upon which to plant themselves. They seem so nonsensical now, that it is almost impossible for us to imagine Harvey caring to reply to them. But, in his day, they were very real, very vexatious, and very hard to bear. To us, they are less than distorted dwarfs, but to him, they were giants whom he had to fight, and with whom he did wrestle hard. As in the glory of an acknowledged triumph, and in the brilliancy of its reward, we may lose sight of the hard fighting, the heavy blows, the waiting, the misrepresentation by enemies, and the desertion by his friends, through which the Hero passed, as he fought and won; and, as he himself—when he can say with thankfulness and truth “I have fought a good fight”—may forget, amidst the acclaim of acknowledged victory, the horrors of the battle-field—although the fighting had been very real, and the blows were very hard;—so, Harvey, in the lull of opposition seems to have been sometimes at rest, and in full enjoyment of the results of his fierce struggle; but while his own conception of the truth was developing day by day and month by month, he struggled hard with the prejudices, the open attacks of jealous competitors, and the scandal of men, too dull to originate, too small to think, too dishonest to appreciate, and too weak to yield. When his great discovery saw the day, his soul rejoiced that a new Truth was born, and, it may be, that he forgot the travail of its birth. But, for all that, the pain had been very real, and it must have needed all his confidence, all his perseverance, all his energy, and all his patience to have borne the trial without once wincing at the pain.

Having said these few things with regard to the preparation made for Harvey by those who had preceded him; and having glanced at the conditions surrounding his active life;

let me call your attention to his forethought, and instructive prevision of some of the results obtained by the labours of those who followed him.

c. Great men have always foreseen much ; or, at all events, have said or seen things of which they perhaps did not, and could not fully appreciate the meaning. They have scattered germs of thought around them, as they passed, through the varying fields of life, to the point, or end that their determination impelled them to attain ; and some of these seeds of future discovery have "fallen on good ground, and brought forth fruit." There is here some instance of the process of "Evolution" in regard to scientific discovery. Harvey reaped much that he had not sown ; but he sowed much more which others, after him, might reap.

The evolution of scientific discovery—which is a matter of simple fact—suggests questions, which cannot be discussed on this occasion, but which we may do well to consider.

Is there any "spontaneous generation" of ideas ?

Can man ever do anything outside the lines in which his forefathers thought and reasoned ?

Can he originate anything, as by a "sport," or, must all that he can think or know, be but the outgrowth of the germ-thoughts of others ; or, the mere learning of details quite far away from what we mean by discovery ?

There is ancient authority for believing that "There is no new *thing* under the sun ;" but has there been no new *thought* ? If creative energy be limited in matter ; is it also limited in mind ? If there has, ever, been an act of "creation," may not such an act be repeated ?

May I not further ask, if, in the words of the really great Men, there are so many fertile seeds, which alone are the germs of all that is to come, we may not, instead of adopting hastily, as we sometimes do, the most charming generalizations of the last few years, and saying, along these lines

all thoughts must run, rather adopt the mood of the great scientific poet of Nature, and feel that "seeing of a thousand seeds, she scarcely brings but one to bear," we should join him in his doubt, and "tremble where we firmly stood"?

If it be that Harvey was right—which modern scientific observation has shown that he was not,—when he suggested that the force which converted sterility into fertility was one that pervaded the whole body,¹ and might last almost indefinitely; then, upon analogy, we might argue that the thought of the great discoverers of all past time may have fertilized the whole race of the thinkers that followed them, and of the thinkers yet unborn; and so "discovery" and "originality" are "surds;" for they could have had no beginning. To this it may be replied—The modern appliances of scientific research have shown that, in some points, Harvey had no means of correcting the dicta of his forerunners by his favourite appeal to Nature. Is it not possible then that we are as yet unsupplied with all the *apparatus criticus* for determining whether or no there is such a possibility as an "original thought?"

i. As a means of estimating the largeness of Harvey's mind, and the wide range of his vision, and how much there was that he "saw" but scarcely can be said to have "looked at," let me recall to your notice some of the more interesting of his *previsions*, as forming part of the work of the individual whose memory we meet to-day to cherish.

We find him saying, "In general the first processes of Nature lie hid, as it were, in the depths of night, and by reason of their subtlety escape the keenest reason no less than the most piercing eye."² In another paper, "All living things . . . derive their origin from a certain primary some-

¹ Thesis on Conception, p. 576, in edition of the works of Harvey, by Dr. R. Willis, for the Sydenham Society.

² *Anatomical Exercises on the Generation of Animals*, p. 225.

thing or primordium which contains within itself both the 'matter' and the 'efficient cause ;' and so is, in fact, the matter out of which, and that by which, whatsoever is produced is made." ³ Again, " It appears advisable to me to look back from the perfect animal, and to inquire by what process it has arisen, and grown to maturity, to retrace our steps from the goal to the starting-place ; . . . so that we shall perceive from what primary matter and from what efficient principles, and in what way from these this plastic form proceeds. . . ." ⁴ Further on, in the same paper, we find him saying, " Man comes into the world naked and unarmed . . . as if Nature had desired that he should be guided by reason rather than be driven by force ; therefore did she endow him with understanding, and furnish him with hands that he might himself construct what was necessary to his clothing and protection. To those animals to which Nature has given vast strength, she has also presented weapons in harmony with their powers ; to those that are not thus vigorous she has given ingenuity, cunning, and singular dexterity in avoiding injury." ⁵ In connection with this, he proceeds to mention the " ornaments . . . offensive weapons, teeth, horns, spurs, and other implements employed in combat . . . the subject of dispute being, no empty or vainglorious matter, but the *perpetuation of the stock* in this line or in that ; as if Nature intended that he who could best defend himself and his, should be preferred to others for the continuance of the kind." ⁶

In the passages just read, we have, as it appears to me, very much the same ideas as are now conveyed by the terms " protoplasm ;" " the relation of man and animals to their environments ;" and the doctrine of " the survival of the fittest."

³ Thesis on the Uterine Membranes and Humours, p. 554.

⁴ Introduction to Exercises on the Generation of Animals, p. 163.

⁵ Ibid. p. 425.

⁶ Ibid. p. 426.

With reference to the significance of the primordium, the protoplasm, as seen by Harvey, let me read another passage from his writings. Speaking of the lowest forms of life known to him, he says, "these have no heart, as not requiring any impeller of nourishment into the extreme parts; for they have bodies which are connate and homogeneous, and without limbs; so that by contraction and relaxation of the whole body they assume and expel, move and remove the aliment. . . . The whole is used as a heart, or the whole animal is a heart."⁷ Further on, "All local motion proceeds from and has its original in the contraction of some part."⁸

Here we have, as it seems to me, an account of the simplest form of life; his counterpart of the "Amœba," as we may find it described in the most modern and, to my mind, one of the most able text-books of physiology of our day.⁹

ii. Another interesting forecast of Harvey's is found in his pointing to the local variations in blood-supply, as being dependent upon the vessels. He describes the extremities as becoming cold, "the nose and cheeks and hands looking blue;"¹⁰ "the fact that in almost every affection, appetite, hope, or fear, our body suffers, the countenance changes, and the blood appears to course hither and thither. In anger the eyes are fiery and the pupils contracted; in modesty the cheeks are suffused with blushes; in fear, and under a sense of infamy, and of shame, the face is pale, but the ears burn as if for the evil they heard or were to hear."¹¹ "The blood," he continues, "varies greatly (in its rate of force and movement) according to age, sex, temperament, habit of body, and other contingent circumstances, external as well

⁷ *An Anatomical Disquisition on the Motion of the Heart and Blood*, p. 76.

⁸ *Ibid.* p. 81.

⁹ Introduction to Michael Foster's Text-book.

¹⁰ *On the Motion of Heart and Blood*, p. 69.

¹¹ *Disquisitions on the Circulation of the Blood*, addressed to John Riolan, p. 129.

as internal, natural or non-natural.”¹² In another place he says, “We allow to the arteries the same motions which we concede to the heart—viz., a diastole and a systole, or return from the distended to the natural state; this much we believe to be effected by a power inherent in the coats themselves.”¹³

The direct object of Harvey in this passage is to show that the heart distends the arteries, and that they collapse by their own contractility; but, taken in conjunction with the other passages that have been quoted, it gives a forecast of what is now of such immense advantage to us—viz., a knowledge of “vaso-motor change.”

He perceived the altered calibre of vessels; he saw this in both contraction and dilatation; he referred this to a power inherent in the coats themselves; he pointed out the relation between these changes and external conditions; also between them and emotional excitement or depression, and yet again, to contingent *internal* circumstances.

A hundred and eighteen years after Harvey published his treatise on the Circulation, Robert Whytt, the President of the Royal College of Physicians, in the sister City of Edinburgh, wrote these words: “Some grow pale upon anger; which effect may be owing to a spasm, or continued contraction of the small arteries of the face, by which the motion of the blood will be retarded;” and again, further on, “In blushing, the increased motion of the fluids through the vessels of the face is accompanied with a glow. . . .;” and yet again, “The sense of cold and shivering is owing to a spasmodic contraction of these vessels, in consequence of that irritation which the nervous system suffers from the febrile stimulus or the beginning inflammation.”¹⁴

¹² Disquisitions on the Circulation of the Blood, addressed to John Riolan, p. 128.

¹³ Page 113.

¹⁴ On the Nature, Causes and Cure of Nervous, Hypochondriac and Hysterical Disorders, pp. 64, 221.

Whytt does not discuss the circulation of the blood as described by Harvey, he assumes it as an established dogma ; he makes no allusion to any anterior suggestion of change in the calibre of vessels ; but he seems, chronologically, to hand down the light of Harvey's torch to these more recent days, in which Claude Bernard, Lister, Brown-Séquard, and others have shown, by their researches, the importance of the knowledge that we now possess of the vaso-motor system of nerves, and its effects upon the function and structure of organs ; as well as its relation to the doctrine, diagnosis, and treatment of disease.

iii. Another illustration of Harvey's speculation, and forecasting of ideas, comparatively new to us, but occurring to him as the result of his observations on the mysteries of generation, will have special interest now. "Let physicians cease to wonder [he says] at the manner in which epidemic, contagious and pestilential diseases scatter their seeds and are propagated to a distance through the air, or by some 'fomes,' producing diseases like themselves, in *bodies of a different nature*, and in a hidden fashion, *silently multiplying themselves by a kind of generation*, until they become so fatal, and, with the permission of the Deity spread destruction far and wide among man and beast ; since they will find far greater wonders than these taking place daily in the generation of animals." ¹⁵

We seem to hear in this sentence the thoughts suggested by the works of Pasteur, Koch, and many others ; and while feeling with them, with Seneca (whom Harvey quotes), and with himself that there is truth in saying "agents greater in number and of more efficiency are required in the construction and preservation of an animal than for its destruction . . . ;" yet, following Harvey, as he followed Seneca in seeing the analogy between the origins of disease and the

¹⁵ On Generation, p. 322.

processes of generation, wonder with him, as he exclaims, "How long a time is conception to be carried out to parturition—with what labour and tenderness is an infant reared . . . but by what a nothing is it destroyed! It takes an age to establish cities, an hour to destroy them."¹⁶ Such thoughts may lead us to ask ourselves—in face of the recent calamities in Marseilles, Naples, and Toulon—do these visitations give sanction to the law of the "survival of the strongest," which was the idea of the generalization of Harvey, or "survival of the fittest," which was that of Darwin? Man dies, nations become extinct, but the Microbe lives on. His earnest cultivators provide him with change of scene, of temperature, of food, and all possible surrounding conditions; and we may almost fancy that we hear the well-tended, and well-cultivated tyrant singing, to some ghastly accompaniment,—

"Men may come, and men may go;
But I go on for ever."

iv. It is difficult to refrain from giving yet another illustration of the mode and degree to which Harvey had forestalled or prepared the way for one of the greatest discoveries since his own time—viz., that of the "reflex action" of the spinal cord. In a letter to Horst, written in 1654-5, he says, looking forward to the work of those who were to follow him, and speaking of himself as "not only far stricken in years, but afflicted with more and more indifferent health . . . I do not doubt but that many things still lie hidden in Democritus's well that are destined to be drawn up into the light by the indefatigable diligence of coming ages."¹⁷ Following up this thought we find him saying, in his *Exercises on Generation*, after distinguishing between the action of the organs of sense,

¹⁶ *On Generation*, p. 322.

¹⁷ *Letters, to Horst and others*, p. 613.

and that of the "sensorium commune," that there are "some actions and motions the government or direction of which is not dependent on the brain . . . that there is a certain sense or form of touch (meaning contact, or impression) which is not referred to the common sensorium, nor in any way communicated to the brain, so that we do not perceive by this sense (*i.e.* impression) that we feel . . . and this sense we therefore distinguish from the proper animal sense." . . . Harvey termed it a "*natural* sense," as distinguished from "*animal* sense;" and he continues, "such a sense do we observe in zoophytes or plant animals, in sponges, the sensitive plant, &c." Using the word "sense" with this interpretation, he treats of many animals, "who are endowed with both sense and motion without having a common sensorium or brain . . . so also [he adds] do certain natural actions take place in the embryo, and even in ourselves, without the agency of the brain, and a certain sensation takes place without consciousness." After speaking of the difference to be observed between "regulated contractions and relaxations to perform any movement, such as progression or prehension," he compares these movements to "the muscles or organs of motion, when affected with spasms or convulsions from an irritating cause," and points out their resemblance to those of "the decapitated cock or hen . . . the convulsive movements of the legs and wings, but all confused and without a purpose, because the controlling power of the brain has been taken away."

The explanation of these movements given by Harvey—*viz.*, that they "proceed from the power of the heart, and depend on it," is certainly not true in the sense in which he intended it, but he gives a most interesting illustration of his physiological insight when he says, "We have an excellent example of both these kinds of motion (animal and

natural) in respiration. For the lungs, like the heart, are continually carried upwards and downwards by a natural (*i.e.*, unconscious and involuntary) movement, and are excited by any irritation to coughing and more frequent action; but they cannot form and regulate the voice, nor can singing be executed, without the assistance and in some sort command, of the sensorium commune."¹⁸

In another paper Harvey gives an interesting account of parturition in "a young woman . . . in a profound state of coma . . . but in whom the application of a powerful sternutatory . . . excited convulsions throughout the body, beginning at the shoulders and gradually descending to the lower extremities. As often as the stimulus was applied the labour advanced . . . until the child was born, without the consciousness of the mother, who still remained in a state of coma."¹⁹

A hundred years after these words were written, Unzer developed the idea still further, in his Treatise on "Animal Nature in Relation to purely Animal Forces, or Vis Nervosa;" and after him Prochaska, in his "Dissertation on the Functions of the Nervous System," defined accurately the limits of the reflective centre; but it was left for Sir Charles Bell, and much more to our own distinguished Fellow, Marshall Hall, to expound the meaning of these movements; to comprehend and reveal the physiology and pathology of action in the spinal cord; to apply this knowledge to the explanation of many diseases, and to devise means for their control or cure. In doing this, he again prepared the way for later researches upon the reflex function, as it affects "local" circulation, and so rendered possible a knowledge of many of the finest points of neural and vascular action, which we, directly, owe to the labours of those great workers to whom allusion has already been made, when

¹⁸ On Generation, p. 432 *et seq.*

¹⁹ On Parturition, p. 535.

dealing with Harvey's foresight of that matter.²⁰ Again, in the passage quoted from the paper on Parturition, we find a curious forecasting of the ingenious application of the reflex theory of Hall to the interpretation of the action of the uterus which was made by Dr. Tyler Smith.

In thus sketching some of the motives which led to the event of last year, and also to the fact of our meeting here to-day, it has been my wish to show that we still hold in reverential regard the perishing remains at Hempstead; and also the living force that is with us, now and here; and which comes to us from our knowledge of the individual, Harvey, in his relation to the past, the surrounding conditions of his time, and his outlook towards the future.

C. There is one thing more, however, that this College has done for many years, and that is, by this annual Oration, to *hand down* to coming generations the memory of him from whom we have learned so much, and to whom our debt of gratitude is larger than we, perhaps, as yet can know; certainly much larger than it falls within the range of my powers to express.

We speak of the "immortal Harvey," but in what sense? To many, his own words would convey all the meaning of that attribute. "The eternity of things," he says, "is connected with the reciprocal interchange of generation and decay; and as the sun, now in the east, and then in the west, completes the measure of time by his ceaseless revolutions, so are the fleeting things of mortal existence made eternal through incessant change; and kinds and species are perpetuated, though individuals die."²¹ True—grandly but sadly true—and yet, our meeting of this day

²⁰ Vid. ant.

²¹ On Generation, p. 226.

is a declaration that such truth is not universal. Much of his work has become a part of common knowledge ; and so, will live on in the lives of those who are the "interpreters of Nature," so long as Nature lasts. But the wish that animates us to-day is to hand down to those who follow us, some knowledge of the Individual to whose life we owe so much, and whose Personality we would not "willingly let die." There are many ways in which this may be done, but I will allude to only two.

1°. The *names* of some great men have been associated with the discoveries that they have made ; and they perhaps are used, many of them, in such familiar way that they carry little or no suggestion of their meaning. In some generation or two, yet to come, may it not be that the etymology of such words as Fallopian tube, Meckel's ganglion, Bright's disease, Addison's disease, Corrigan's pulse, Galvanism, Faradism, an Ohm or a Volt will have become somewhat obscure ? Or, if the meaning of such phrases may be found in lexicons, are there many who will try to find out those meanings ? It seems to me probable that individuality will not be maintained by such means ; and that future students may sometimes be disposed to ask—as I once heard the question put quite seriously—whether or no the "portal vein" was not named after the distinguished French physician Portal !

While the progress of science is constructive, of generalization, and so-called "laws," it is destructive, as Harvey says, of the individual life ; but yet we give "names" to organs functions, forces, and shrewd connotations of phenomena, in order—while finding them convenient at the time—to delay if not arrest, the disintegration of the work of those men, whose names we thus hand down to those who follow us.

Do we not think it probable that, as future research proceeds, some of these names—which have passed into many

countries and many tongues—may be lost sight of, and be so decomposed that they pass out of common use?

At this hour, and still in the lifetime of our honoured President—whom may God long preserve—the phrase “Continued Fever” has passed into practical disuse; and this has been due, mainly if not exclusively, to the industry and genius which led him to disintegrate the name, trace out the causes, and define the maladies, that had long passed under that common term.

2°. Again, there are certain *days* by which the memory of great men is perpetuated. From very olden times until now; and, from the far east to the far west, “days” are set apart for the purpose of recalling individual lives. Ceremonies, of all kinds, have been parts of these human, national, and instinctive acts. They begin in the smallest families with the “Birthdays” and they stretch out to the acts of the greatest Nations.

This is “St. Luke’s Day,” in the calendar of millions. There are days still set apart, compared in antiquity with which the observance of St. Luke’s Day is but a modern event. Two hundred and eighty years have passed since Harvey was a member of this College: for two hundred and fifty-six years his great work (*de motu cordis et sanguinis*) has been before the world: two hundred and twenty-seven years have elapsed since he was buried in the quiet little church of Hempstead. And yet, only one year has passed since this College removed his remains still “lapt in lead” from the vault in which they had lain so long, and placed them in the safer keeping of new and carefully selected marble.

With us, although it is not so named, this is “Harvey’s Day,” and three hundred years have passed since he was born. How long this commemoration will continue we cannot tell. Our knowledge of the future, if we have any, is

but scant. Who knows whether, when another sixty-nine years have passed, "Waterloo Day" will be kept in memory of Wellington?

No one can answer us in our questions. But this we may do, we may look to the past, and learn its lessons; we may look to humanity and read its instincts; we may read the record of this College, and know its feeling; and of this we may be sure, that—although Harvey's name may be unknown to many in the days to come—yet so long as disease lasts; so long as the movements of the blood form part of the study of the physiologist and the art of the physician; so long as any further light is to be thrown upon them, by cardiograph or sphygmograph, or by any as yet unthought-of method of investigation; so long as "the circulation" is a recognized fact of science, his work will live; and, although, much of it may lie hidden in the "common notions" of the future, yet the life of Harvey will be maintained, in its integrity, by the future Fellows of this College; and the greatness of his character will be brought, again and again, to light by many who will, more adequately than I can do, discharge the duties of this day.

It has been my wish, in what has hitherto been said, to lay before you some explanation of the motives that bring us together now; and also of those that led this College, last year, to the grave of Harvey. But further,—

II. If we would now appreciate the work of Harvey, let us for a moment try to eliminate from our knowledge the fact of "the circulation of the blood," and then imagine ourselves to be face to face with the diseases that we are daily treating; with fever, apoplexy—hæmorrhagic, embolic, or diathetic; with dropsy, with cardiac disease, recent or old, with degeneration of structure, or with functional derange-

ment. It requires some force of fancy to realize what would be our position. The thermometer might teach us much ; but it is difficult to see in what way either stethoscope, cardiograph, or sphygmograph could do other than augment our bewilderment. Those who have made out for us the meaning of the cardiac sounds ; those who have skilfully constructed apparatus so as to make the heart itself record, in some fashion, its own marvellous movements ; and those who have delineated, in some sense, the curve and time-ordered elements of the radial pulse, would all admit that their work was based upon this foregone conclusion, the accepted fact, that the blood moved onwards in a circle. They have attained to knowledge that Harvey could not reach ; but let me ask, could they have known what they now do, unless Harvey had raised the platform upon which they stood ? The "thoughts of men are widened by the process of the suns ;" and, by slow degrees, others might have done the work, or made the discovery, that he made ; but the effect of his energy was a grand upheaval of the crusted surface of the past ; a Titanic throe, that brought to the birth a new and mighty force and fact ; and, when some of the dust and boulders had been cleared away, placed all who followed him on a higher plane, and in a clearer light.

It is given to the few great men to save the time and labour of the many. They not only take strides that would be impossible for those of lesser build, but they carry with them—over the bridge that they have thrown across the great gulf between the question of yesterday and the answer of to-day—all those who have eyes to see, ears to hear, and hearts to follow.

III. Next, let me bring before your notice some of the main features of Harvey's "character," as this displays

itself in his written "work." Chronologically, his character must precede his work; but the former was developed by the latter. These things act and react; moral forces become greater as our toil grows harder; and, in so doing, give not only fresh impulse, but increased strength for work.

1. Throughout Harvey's writings there is an eminently religious tone; a devout and reverential recognition of God; not only as the great primal, ever-acting Force, behind, outside, and before all the works of Nature; but as the Being "the Almighty and Eternal God," to whom, as he says in his last will and testament, "I doe most humbly render my soule (as to) Him that gave it; and to my blessed Lord and Saviour Jesus Christ." ²²

But Harvey did not let his religious convictions hold him in the tight grasp of what has been termed the "theologic stage" of development; nothing prevented him from seeing all that he could see, and frankly telling all that he believed; and so we find him spurning some of the figments about "the spirits . . . of a sublime, lucid, ethereal, celestial, or divine nature," when they are employed to fill up gaps in the physiology of his day; and comparing those who use them "to the vulgar and unlettered who when they do not comprehend the causes of various effects, refer them to the immediate interposition of the Deity." ²³

Harvey, although saying that "the Divine mind of the Eternal Creator which is impressed on all things creates the image of itself in human conceptions;" ²⁴ and again, that all the arts are but imitations of Nature . . . as our reason or understanding is a derivative from the Divine intelligence manifested in his works;" and still further affirming as follows—"wherefore, according to my opinion, he takes the right and pious view of the matter, who derives all generation

²² Will of Harvey, p. lxxxix.

²³ On the Circulation, p. 120.

²⁴ On Conception, p. 582.

from the same eternal and omnipotent Deity, on whose nod the universe itself depends ;” yet shows his freedom from theologic dogma, and his wide range of thought in adding, “Nor do we think that we are greatly to dispute about the name by which this first agent is to be called or worshipped ; whether it be God, Nature, or the soul of the universe—whatever the name employed—all still intend by it, that which is the beginning and the end of all things ; which exists from eternity and is almighty ; which is author or Creator, and, by means of changing generations, the preserver and perpetuator of the fleeting things of mortal life ; which is omnipresent, not less in the single and several operations of natural things than in the infinite universe.”²⁵

We are reminded by this passage of the well-known dialogue, in which Faust, replying to Margaret’s examination of his creed, says—

“Call it whate’er thou wilt—heart, love, or God,
Or happiness !—I cannot give it name.”

And the fair Margaret makes answer—

“All that is very good and true ;
Nearly the same the Priest says too,
Only in somewhat other words than you.”

But Harvey recurs to the same theme, and after saying that “the most perfect man, whose highest excellence is that he knows himself ;” adds, “we ourselves, as is seeming in these days (hold) as the Almighty first cause of all things the Creator and Father of all that is in heaven and earth, on whom animals depend for their being, and at whose will and pleasure all things are and were engendered.”²⁶

“It is true,” said he, in conversation with Dr. Ent, “the examination of the bodies of animals has always been my delight ; and I have thought that thence we might not only

²⁵ On Generation, p. 370.

²⁶ Ibid. p. 402.

obtain an insight into the lighter (? higher) mysteries of Nature, but there perceive a kind of image or reflex of the omnipotent Creator himself." ²⁷

2. If Harvey, though a devout believer in God, was yet free from all the restraints of the so-called "theologic stage;" he also, although a learned and keen metaphysician, had escaped from the trammels of what has been termed the "metaphysic stage." He had "cast them off with as much ease as Samson his green withes." He meets the metaphysician on his own ground with clever dialectic; but he pours contempt on those "who advocate incorporeal spirits, having no ground of experience to stand upon;" adding that "their spirits indeed are synonymous with powers or faculties, such as a concoctive spirit, a chylopoietic, &c., they admit as many spirits as there are faculties or organs." And, before this, with regard to the nature of "the spirits," he says "There are so many and such conflicting opinions, that it is not wonderful that the spirits whose nature is thus left so wholly ambiguous should serve as the common subterfuge of ignorance. Persons of limited information, when they are at a loss to assign a cause for anything, very commonly reply that it is done by the spirits; and so they bring the spirits into play upon all occasions; even as indifferent poets are always thrusting the gods upon the stage as a means of unravelling the plot, and bringing about the catastrophe."²⁸ Harvey did not base his conclusions upon *à priori* metaphysics, but on solid facts.

3. If it be asked what was, then, his position; and what was the method he employed?—my reply is that he being one of "the freemen whom the truth makes free," held the position of an observer, a questioner, and inter-

²⁷ Epistle Dedicatory, p. 146.

²⁸ On the Circulation, p. 115 *et seq.*

preter of Nature. In the Letter, by which he dedicates to the President and Fellows of this College, his "Anatomical Disquisition on the Motion of the Heart and Blood in Animals," he declares himself "the partisan of truth alone."²⁹ and throughout all his writings that follow he never swerved from the position he had taken. To him "virtue," as it has been well said by Emerson, "lay in the adherence in action to the nature of things; and the nature of things made it prevail."

The intense love that Harvey felt for Nature led him to choose her as his constant companion, and his guide in the search for truth. There was nothing that she could show him that was too great for him to attempt to understand; nothing too small for him to pass by, or to regard with other feelings than those of affection, of reverence and wonder. The teaching of Nature was to him absolute in its authority. "The facts cognisable by the senses," he says, "wait upon no opinions, . . . the works of Nature bow to no antiquity; for indeed there is nothing either more ancient or of higher authority than Nature."³⁰

Harvey "observed" the facts before him,—and he had eyes to see;—but, not content with the "experiments prepared by Nature," he "made" new facts, by his skilful manipulation of the materials that were lying at his hand; and thus he asked pertinent questions, and obtained their answers. He thought about all these things; he reasoned upon them all; he sought and found all the help that metaphysical method and learning of the schools could render him; and, then, he became their "Interpreter."

His mode of progression may be defined as "longitudinarian" (if I may use a word, coined, some years ago, in opposition to one very familiar to us all)—*i.e.*, he looked and worked straight from end to end. His line was

²⁹ On the Motion of the Heart, p. 7. ³⁰ On the Circulation, p. 123.

the shortest one that he could draw between the simplest—the first—fact observed and the most remote object of his gaze. He thought in “a straight line;” he never swerved in his forward march; but, as he passed onwards, he saw things outlying, on by-paths, but his own force of movement dragged them into his own well-chosen course, and he made them help him on his way. Arrived at his goal, he arranged his materials with care, and proceeded to explain their meaning by a simple inductive process. But, still keeping the same point in view, he approached it from other sides. Sometimes his lines, although converging, did not meet at the point he quite expected. Here, his power of thinking outside of, and beyond the facts came to help him; he made new observations, new experiments, and at last focussed them on a point made bright by the rays of his own genius. Dr. Ent spoke but the truth when he said to the President and Fellows of this College, “Our Harvey rather seems as though discovery were natural to him; a thing of ease, and, of course, a matter of ordinary business; though he may nevertheless have expended infinite labour and study on his works.”³¹

4. Harvey made use of working hypotheses; but he never confounded them with either facts, inductions, or laws. He claimed in one of his ingenious theses the liberty which he willingly yielded to others, “to put forward as true (in matters full of obscurity) such things as appear to be probable until proved to be manifestly false;”³² and after demolishing many theories of others, “prayed for a place” for his own “conjecture until something certain should be established in the matter.”³³

5. If some fact, apparently opposed to a truth that Harvey believed himself to have established, confronted him in his way, he rode over it, with a force that could only

³¹ Epistle Dedicatory, p. 149. ³² On Conception, p. 577. ³³ Ibid. p. 580.

come from the momentum that his strong conviction had given to his movement onwards. For example, he says, "There is one experiment which I would have every one try who is anxious for truth, and by which it is clearly shown that the arterial pulse is owing to the impulse of the blood. Let a portion of dried intestine . . . be taken and filled with water, and then secured at both ends like a sausage: by tapping with the finger at one extremity, you will immediately feel a pulse and vibration in any other part to which you apply the fingers, as you do when you feel the pulse at the wrist." After referring to the manner in which such percussion may be made of use in distinguishing between air and fluid in the abdomen, he continues,— "Having brought forward this experiment I may observe, that a most formidable objection to the circulation of the blood rises out of it, which, however, has neither been observed nor adduced by any one who has written against me;" and then he falls back upon his observations which show that, in spite of this seeming difficulty, the circulation has been proved. He says that he had "already satisfactorily replied to this difficulty;" and such is true, inasmuch as he had pointed out that all the blood did not pass through the vessels, but that some of it was detained for nutrition; he had spoken of the contractility of the arteries, and of the impulse wave; but his solution of the difficulty, that he himself alone had seen, was founded on his confidence in the truth of his main assertion.

6. Boldness was a great feature of Harvey's character, when he told any of the truths he knew. "It were," he says, "disgraceful . . . with this most spacious and admirable realm of Nature before us . . . did we take the reports of others upon trust. . . . Nature is herself to be addressed; and the paths she shows us are to be boldly

trodden. . . .”³⁴ And again, at a later period, he writes : “The doctrines inculcated on the subject of the humours, and which, as being entertained by the ancients, Fabricius regards as certain truths, requiring no further proofs, are inconsistent and false.”³⁵

7. But Harvey, although bold and strong, was meek, cautious, and polite. He preferred “being wise with the few to going wrong with the many. . . .”³⁶ Dr. Ent, in conversation with Harvey, said to him: “You yourself, I well remember, informed me once that you had never dissected any animal—and many and many a one you examined—but that you discovered something unexpected, something of which you were formerly uninformed.”³⁷ He was “greatly afraid lest he might be charged with presumption, did he lay his work before the public at home, or send it beyond seas for impression unless (as he says) I had first proposed its subject to you (the President and Fellows of this College), and had confirmed its conclusions by ocular demonstrations in your presence, had replied to your doubts and objections, and secured the assent and support of our distinguished President.”³⁸

Perhaps it might be well if a similar submission were sometimes adopted in this nineteenth century. But so much has been added to what is called our scientific Literature during the third quarter of this century and its now current fourth, that, perhaps, no officer of the College will thank me for the suggestion.

8. Harvey fully realized the value to be attached to the “conclusions to which others had come who had looked” at facts for themselves ; but he adds, “he who truly

³⁴ Introd. to Ex. on Gen., p. 153.

³⁵ Of the Humours, p. 557.

³⁶ Intr. to Ex. on Gen. p. 152.

³⁷ Epistle Dedicatory, p. 146.

³⁸ Dedic. to R.C.P. of Thesis on the Motion of the Heart and Blood, p. 6.

desires to be informed" must be held bound to *look for himself*, . . . for "it is our duty to approve or disapprove, to receive or reject, everything only after the most careful examination . . . to examine, to test whether anything has been well or ill advanced, to ascertain whether some falsehood does not lurk under a proposition . . . it is imperative on us to bring it to the proof of such, and to admit it or reject it on the decision of such." ³⁹

9. In much of his writing, Harvey was both humorous and eloquent, and he could exhibit high indignation when he dealt with his detractors, yet "to return evil speaking with evil speaking" he held "to be unworthy in a philosopher and a searcher after truth." The passage, however, that follows this, shows that Harvey could (as Sir Anthony Absolute did), if he were tempted to do so, use "strong language;" for he comforts Riolanus by assuring him that "it cannot be helped that dogs bark, and vomit their foul stomachs, or that cynics should be numbered among philosophers; but care must be taken that they do not bite or inoculate their mad humour, or with their dog's teeth gnaw the bones and foundations of truth;" ⁴⁰ but we must remember that this was not said *to* his detractors, but only *of* them; said to his friend Riolanus; and, moreover, it was said in Latin, and that makes all the difference!

But with the exception of a few scattered passages of just wrath, Harvey was always dignified, lenient, and calm. He was, as his contemporary Ent said of him, "beyond all praise," and it may be justly repeated of him, when regarding the strength and gentleness of his great heart:—

"He has outsoared the shadow of our night,
Envy and calumny, and hate and pain,
And that unrest which men miscall delight,
Can touch him not and torture not again."

³⁹ On the Circulation, p. 131.

⁴⁰ Ibid. p. 110.

He acquired Fame, which certainly was not to him "the spur" that might his

"clear spirit raise
To scorn delights and live laborious days."

It may be, as was said of others in his day, that it was "the last infirmity of noble minds," but it was not so with our illustrious Harvey. "Think me not eager," he says, in one of his Introductory Letters, (On Gen. p. 166,) "for vainglorious fame rather than anxious to lay before you observations that are true, and that are derived immediately from the nature of things." Truth was what he sought, and what he found; and if Fame went with him, and followed him to his grave, and waits upon him now, there was no seeking for it on his part; nor could he well have imagined, with all his force of fancy, such a tribute to his memory as that, of last year, in the churchyard at Hempstead.

10. Harvey's great achievements were the result of his method—viz., that of observation and experiment. Nature "displays" much; "the Heavens declare the glory of God," and she is always "revealing" as she moves, and she is never still; but Nature is ever moving "onwards" to some unknown goal; and at each onward step she, while revealing, "hides;" leaves behind her in her wake something of the past, which now we cannot see, and presents new facts and new combinations for man,—one of her factors,—to interpret.

Harvey was one of her keenest, and most devout interpreters. To him, as he stood by and listened, the Nature-spirit sang, and with profoundest meaning,

"So work I at Time's rushing loom,
And weave the living robe of God."

11. In reverence Harvey knelt before her, but not satisfied with what he saw and heard, he asked her *questions*—and this, with no notion of confusing her, or misreading what she had already said or written,—for he was just the kind of questioner to ask the kind of question to which she readily gave answer.

He examined her “in chief” to find out the *right*; he “cross-examined” her, but in no unfriendly tone, to bring her answer to a “yes” or “no,” and so disprove the *wrong*, the untruth which other questioners had placed in evidence.

“Nature,” said he to Ent, “is the best and most faithful interpreter of her own secrets; and what she presents either more briefly or obscurely in one department, that she explains more fully and clearly in another. . . . Truth,” he continues, “scarce wants an advocate.” Nature to him was a perfect verity: the one witness that could never be abashed or shaken; the one witness in whom there could be no false way; the one witness who could not lie.

There was no need to put her “on her oath,” for she, in her prime, had been adjured, by the Most High God, to tell “the truth, and nothing but the truth.” This she has always done, is doing now, and will, as we believe, go on to do.

But, can she tell “the whole truth?” Will Nature ever tell, or teach, us this?

I can not presume to answer the question which yet I dare to ask; but my own conviction is, that she neither will nor can do this thing until the last hour of Time has struck, and has ushered in the dawn of that one, long, clear, eternal day, whose “sun shall no more go down,” and, in whose ever-growing light, we may hail the presence of that

“far-off Divine event,

To which the whole creation moves.”

**PRINTED BY BALLANTYNE, HANSON AND CO.
LONDON AND EDINBURGH**



